

## ***Chronology of NASA Expendable Vehicle Missions Since 1990***

<b>Launch Date</b>	<b>Payload</b>	<b>Launch Vehicle</b>	<b>Site<sup>1</sup></b>
<b>June 1, 1990</b> 5:48 p.m. EDT	<b>ROSAT</b> ( <i>Roentgen Satellite</i> ) An X-ray observatory developed through a cooperative program between Germany, the U.S., and the United Kingdom. Originally proposed by the Max-Planck-Institut für extraterrestrische Physik (MPE) and designed, built and operated in Germany. Launched into Earth orbit on a U.S. Air Force vehicle. Mission ended after almost nine years, on Feb. 12, 1999.	Delta II (Delta 195)	ETR, LC 17A
<b>July 25, 1990</b> 3:21 p.m. EDT	<b>CRRES</b> ( <i>Combined Radiation and Release Effects Satellite</i> ) NASA payload. Launched into a geosynchronous transfer orbit for a nominal three-year mission to investigate fields, plasmas, and energetic particles inside the Earth's magnetosphere. Due to onboard battery failure, contact with the spacecraft was lost on Oct. 12, 1991.	Atlas I (AC-69)	ETR, LC 36B
<b>May 14, 1991</b> 11:52 a.m. EDT	<b>NOAA-D (TIROS)</b> ( <i>National Oceanic and Atmospheric Administration-D</i> ) A Television Infrared Observing System (TIROS) satellite. NASA-developed payload; USAF vehicle. Launched into sun-synchronous polar orbit to allow the satellite to view the Earth's entire surface and cloud cover every 12 hours. Redesignated NOAA-12 once in orbit.	Atlas-E (Atlas 50-E)	WTR, SLC 4
<b>June 29, 1991</b> 10:00 a.m. EDT	<b>REX</b> ( <i>Radiation Experiment</i> ) USAF payload; NASA vehicle. Launched into 450 nm polar orbit. Designed to study scintillation effects of the Earth's atmosphere on RF transmissions. 114th launch of Scout vehicle.	Scout 216	WTR, SLC 5
<b>June 7, 1992</b> 12:40 p.m. EDT	<b>EUVE</b> ( <i>Extreme Ultraviolet Explorer</i> ) NASA payload; USAF vehicle. Launched into Earth orbit. Operating in the relatively unexplored extreme ultraviolet (70-760 Å) band, EUVE completed a survey of the entire celestial sphere to determine the existence, direction, brightness and temperature of numerous objects that are sources of extreme ultraviolet radiation. EUVE ceased operation on Feb. 1, 2001.	Delta II (Delta 210)	ER, LC 17A
<b>July 3, 1992</b> 10:24 a.m. EDT	<b>SAMPLEX</b> ( <i>Solar, Anomalous and Magnetospheric Particle Explorer</i> ) NASA payload with German and U.S. instruments; NASA vehicle. Launched into Earth orbit. Designed to contribute new information on the composition of energetic particles arriving at Earth from the solar atmosphere and interstellar space. First Small Explorer mission.	Scout 215	WR, SLC 5
<b>July 24, 1992</b> 10:26 a.m. EDT	<b>Geotail</b> NASA/Japanese spacecraft. First launch under Medium Expendable Launch Vehicle (MELV) launch vehicle services contract. Geotail part of International Solar Terrestrial Program (ISTP). Launched into Earth orbit to explore the dynamic relationship between the Sun's solar wind and the Earth's magnetic field and various magnetosphere components, including the Van Allen belts and the Earth's geomagnetic tail.	Delta II (Delta 212)	ER, LC 17A

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Sept. 25, 1992	<b>Mars Observer</b> (mission failure) Spacecraft ceased communication after Mars orbital entry burn on Aug. 22, 1993. Multifaceted satellite designed to study the geology, geophysics and climate of Mars from polar orbit. Science instruments from Mars Observer were reflown on two other Mars orbiters, Mars Global Surveyor and 2001 Mars Odyssey.	Commercial Titan (CT-4)/ Transfer Orbit Stage (TOS)	ER, LC 40
Nov. 21, 1992	<b>MSTI I</b> ( <i>Miniature Seeker Technology Integration I</i> ) Strategic Defense Initiative Organization (SDIO) payload; NASA vehicle. Launched into Earth orbit to support the development of advanced theater missile defenses for the armed forces.	Scout 210	WR, SLC 5
June 25, 1993	<b>RADCAL</b> ( <i>Radar Calibration Satellite</i> ) USAF satellite; NASA vehicle. Launched into Earth orbit. Satellite used to calibrate C-band radars around the world	Scout 217	WR, SLC 5
Aug. 9, 1993	<b>NOAA-I (TIROS)</b> ( <i>National Oceanic and Atmospheric Administration-I</i> ) A Television Infrared Observing System (TIROS) satellite. NASA-developed payload; USAF vehicle. Launched into polar Earth orbit. Spacecraft ceased communication two weeks after nominal launch.	Atlas-E (Atlas 34-E)	WR, SLC 4
April 13, 1994 2:04 a.m. EDT	<b>GOES-I</b> ( <i>Geostationary Operational Environmental Satellite-I</i> ) Renamed GOES-8 once in orbit. NASA-developed payload for the National Oceanic and Atmospheric Administration (NOAA). Launched into geosynchronous Earth orbit. First in advanced series of GOES weather satellites.	Atlas I (AC-73)	ER, LC 36B
May 8, 1994	<b>MSTI II</b> ( <i>Miniature Seeker Technology Integration II</i> ) Ballistic Missile Defense Organization (BMDO, formerly SDIO) payload; NASA vehicle. Launched into Earth orbit to support the development of advanced theater missile defenses for the armed forces.	Scout 218 (Last NASA Scout)	WR, SLC 5
Nov. 1, 1994	<b>Wind</b> NASA payload carrying international space science instruments. Wind first of two missions in Global Geospace Science initiative, U.S. contribution to International Solar Terrestrial Physics (ISTP) program. Lunar swingby.	Delta II (Delta 227)	ER, LC 17B
Dec. 30, 1994	<b>NOAA-J (TIROS)</b> ( <i>National Oceanic and Atmospheric Administration-J</i> ) A Television Infrared Observing System (TIROS) satellite. NASA-developed payload; USAF launch. Launched into polar Earth orbit.	Atlas-E (Atlas 11-E)	WR, SLC 4
May 23, 1995 1:52 a.m. EDT	<b>GOES-J</b> ( <i>Geostationary Operational Environmental Satellite-J</i> ) Renamed GOES-9 once in orbit. NASA-developed payload for the National Oceanic and Atmospheric Administration (NOAA). Launched into geosynchronous Earth orbit.	Atlas I (AC-77)	ER, LC 36B
Nov. 4, 1995	<b>RADARSAT; SURFSAT-1</b> ( <i>Radar Satellite; Summer Undergraduate Research Fellowship Satellite-1</i> ) RADARSAT cooperative effort between Canadian Space Agency, NASA, and NOAA. Launched into low Earth orbit.	Delta II (Delta 229)	WR, SLC 2

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Dec. 2, 1995	<b>SOHO</b> ( <i>Solar and Heliospheric Observatory</i> ) Payload a cooperative European Space Agency (ESA)/NASA effort; launch vehicle services contract. SOHO part of International Solar Terrestrial Program (ISTP). Halo orbit (937,000 miles/1.5 million kilometers) from Earth toward Sun.	Atlas IAS (AC-121)	ER, LC 36B
Dec. 30, 1995	<b>XTE</b> ( <i>X-ray Timing Explorer</i> ) NASA payload. Launched into low Earth orbit. Renamed Rossi XTE to honor the late Professor Bruno Rossi of MIT, one of the pioneers of X-ray astronomy. Carried the largest X-ray detector yet flown in space, the Proportional Counter Array.	Delta II (Delta 230)	ER, LC 17A
Feb. 17, 1996 3:43 p.m. EST	<b>NEAR</b> ( <i>Near Earth Asteroid Rendezvous spacecraft</i> ) NASA payload. Delta VEGA trajectory (Delta V/ Earth Gravity Assist). Designed to study the origin and composition of asteroids, comets, and the solar system. Renamed NEAR Shoemaker for the late Gene Shoemaker, geologist who influenced research on the role of asteroids in shaping the planets. Landed on asteroid 433 Eros on Feb. 12, 2001, at 3:01:52 p.m. EST.	Delta II (Delta 232)	ER, LC 17B
Feb. 24, 1996	<b>Polar</b> NASA payload. Final mission of NASA's Global Geospace Science (GGS) program, the U.S. contribution to International Solar Terrestrial Physics (ISTP) effort (see also Wind, November 1994). Launched into elliptical polar orbit.	Delta II (Delta 233)	WR, SLC 2
July 2, 1996	<b>TOMS-EP</b> ( <i>Total Ozone Mapping Spectrometer/Earth Probe Satellite</i> ) Spacecraft designed for high-resolution measurements of ozone to map in detail the global ozone distribution as well as the Antarctic "ozone hole."	Pegasus-XL (M11)	WR
Aug. 21, 1996	<b>FAST</b> ( <i>Fast Auroral Snapshot Explorer</i> ) Spacecraft to observe the auroral regions by measuring rapidly varying electric and magnetic fields together with the associated acceleration of electrons, protons and ions. The science objective is to examine the processes and physical causes of complex auroral displays and how these processes affect the Earth.	Pegasus-XL (M20)	WR
Nov. 4, 1996 (launch failure)	<b>SAC-B/HETE</b> ( <i>Satellite de Aplicaciones Cientificas-B/ High Energy Transient Experiment</i> ) SAC-B, a cooperative project between NASA and Argentina designed to study solar flares, gamma ray bursts, and diffuse cosmic X-ray background. HETE mission led by MIT to study gamma ray bursts. Spacecraft did not separate from rocket due to upper battery failure.	Pegasus-XL (M18)	Wallops Flight Facility
Nov. 7, 1996	<b>Mars Global Surveyor</b> NASA payload; mission to map Mars' surface features and examine its atmosphere and magnetic properties.	Delta II (Delta 239)	ER, LC 17A
Dec. 4, 1996	<b>Mars Pathfinder</b> NASA payload; delivered a lander and small robotic rover, Sojourner, to the surface of Mars using direct entry, descent and landing; study and record data about ancient rocks.	Delta II (Delta 240)	ER, LC 17B

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April 25, 1997 1:49 a.m. EDT	<b>GOES-K</b> ( <i>Geostationary Operational Environmental Satellite-K</i> ) Renamed GOES-10 once in orbit. Next-generation weather satellite providing improved weather imagery and atmospheric sounding information for NOAA.	Atlas I (AC-79)	ER, LC 36B
Aug. 1, 1997	<b>SeaStar/SeaWiFS</b> ( <i>Sea-viewing Wide Field-of-View Sensor</i> ) Oceanography instrument developed by NASA-Goddard Space Flight Center for the commercial SeaStar ocean surveillance satellite. Instrument provides ocean-color data for observation of living organisms and tracking of plankton blooms, outbreaks of red tide, oil spills or chemical pollution.	Pegasus-XL (M26)	WR
Aug. 23, 1997	<b>Lewis</b> (mission failure) Launched with the goal of demonstrating advanced science instruments and spacecraft technologies for measuring changes in earth's terrestrial surface. The spacecraft entered a flat spin in orbit that resulted in a loss of solar power and a fatal battery discharge. Contact with the 890-pound spacecraft was lost Aug. 26, and it re-entered the atmosphere on Sept. 28. The companion mission, Clark, was canceled by NASA due to cost overruns.	LMLV	SLC-6
Aug. 25, 1997 10:39 a.m. EDT	<b>ACE</b> ( <i>Advanced Composition Explorer</i> ) A spin-stabilized spacecraft investigating the origin and evolution of solar phenomenon, the formation of the solar corona, solar flares and the acceleration of the solar wind.	Delta II (Delta 247)	ER, LC 17A
Oct. 15, 1997 4:43 a.m. EDT	<b>Cassini</b> NASA-JPL spacecraft with international partners European Space Agency and Italian Space Agency; four-year exploratory mission of Saturn, its rings and 18 known moons. ESA's Huygens Probe to be deployed to the surface of Saturnian moon Titan.	Titan IV/Centaur (K33/TC-18)	ER, LC 40
Jan. 6, 1998 9:28 p.m. EST	<b>Lunar Prospector</b> NASA-Ames Research Center spacecraft; mapping mission of the Earth's moon; recording gravitational and magnetic fields, identifying mineral composition on the surface, seeking clues about the lunar core, and successfully finding evidence of polar ice.	Athena II	ETR, LC 46
Feb. 15, 1998	<b>SNOE</b> ( <i>Student Nitric Oxide Explorer</i> ) NASA-sponsored spacecraft built by the students of the University of Colorado at Boulder. The satellite measures the effects of the sun's x-ray radiation and magnetic field on nitric oxide production in the Earth's upper atmosphere which may affect climatic change.	Pegasus XL (M27)	WR
April 1, 1998	<b>TRACE</b> ( <i>Transition Region and Coronal Explorer</i> ) NASA payload to improve understanding of events in the sun's atmosphere, including intense storms and flares.	Pegasus XL (M25)	WR

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May 13, 1998	<b>NOAA-K</b> ( <i>National Oceanic and Atmospheric Administration-K</i> ) Weather satellite for NOAA. Designated NOAA-15 once in space, the satellite provides high resolution pictures together with data of land and sea temperatures, vertical moisture profiles, and ozone measurements within the troposphere and stratosphere. NOAA-K has a Space Environment Monitor to provide warning of increases in solar wind, and a search and rescue (SARSAT) transponder for detection and relay of distress signals.	Titan II	WR, SLC-3E
Oct. 24, 1998	<b>Deep Space 1 (DS1)</b> Validated 12 advanced technologies, including an ion propulsion engine, in deep space to lower the cost and risk to future science-driven missions that may use them for the first time. Completed its primary mission in September 1999. An extended mission to fly by Comet Borrelly was achieved on Sept. 22, 2001 despite the loss of DS1's star tracker. Mission ended Dec. 18, 2001.	Delta II (Delta 7326-9.5 Med-Lite - first use of this model)	ER, LC 17A
Dec. 5, 1998 7:57 p.m. EST	<b>SWAS</b> ( <i>Submillimeter Wave Astronomy Satellite</i> ) NASA Small Explorer Project (SMEX). Two-year mission designed to help scientists gain a greater understanding of star formation by determining the composition of interstellar clouds, and establishing the means by which these clouds cool as they collapse to form stars and planets.	Pegasus XL	WR
Dec. 11, 1998 1:45:51 p.m. EST	<b>Mars Climate Orbiter</b> (mission failure) One of the pair of Mars '98 missions. The orbiter was to be used primarily to support its companion, the Mars Polar Lander, by acting as a relay station for data transmissions to and from the lander and Earth, and to collect data about Mars. The spacecraft was lost on Sept. 23, 1999, after the orbiter fired its main engine to go into orbit around the planet.	Delta II (Delta 7425)	ER, LC 17A
Jan. 3, 1999 3:21:10 p.m. EST	<b>Mars Polar Lander</b> (mission failure) One of the pair of Mars '98 missions. The lander was solar-powered and designed to touch down on the Martian surface near the northern-most boundary of the south pole to study the water cycle there. All communication with the spacecraft was lost on Dec. 3, 1999, after it attempted to land on the planet. Also lost were the Deep Space 2 microprobes aboard.	Delta II (Delta 7425)	ER, LC 17B
Feb. 7, 1999 4:04:15 p.m. EST	<b>Stardust</b> The first comet sample return mission. Aerogel will be used to capture comet particles during a planned close encounter with comet Wild 2, as well as samples of interstellar dust, and return them to Earth from deep space. The reentry capsule is expected to parachute to Earth in 2006.	Delta II	ER, LC 17A
March 4, 1999 9:56 p.m. EST	<b>WIRE</b> ( <i>Wide-Field Infrared Explorer</i> ) A Small Explorer mission designed to help astrophysicists understand the formation and evolution of "starburst" galaxies and search for distant ultra-luminous galaxies.	Pegasus XL	WR
April 15, 1999 2:32 p.m. EDT	<b>Landsat 7</b> Used to acquire remotely sensed images of the Earth's land surface and surrounding coastal regions.	Delta II	WR, SLC 2

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May 18, 1999 1:09 a.m. EDT	<b>TERRIERS</b> ( <i>Tomographic Experiment using Radiative Recombinative Ionospheric EUV and Radio Sources</i> ) (mission failure) NASA-funded under Student Explorer Demonstration Initiative. Designed by students at Boston University to study how changes in the ionosphere affect global communication systems. Lost power because spacecraft not able to orient itself so that its solar panels fully faced the Sun.	Pegasus	WR
June 19, 1999 10:15 p.m. EDT	<b>QuikSCAT</b> ( <i>Quick Scatterometer</i> ) The primary instrument on the spacecraft is "Sea Winds," a specialized microwave radar to collect frequent, high-resolution measurements about the speed and direction of winds near the ocean surface. It is part of NASA's Earth Observing System (EOS) which is designed to address global environmental changes, regional weather patterns and climate.	Titan II	WR, SLC 4W
June 24, 1999 11:44 a.m. EDT	<b>FUSE</b> ( <i>Far Ultraviolet Spectroscopic Explorer</i> ) This space telescope was designed to scour the cosmos for the fossil record of the origins of the universe. It will be used to study the earliest relics of the Big Bang—hydrogen and deuterium—and thereby, to determine how the primordial chemical elements of which all the stars, planets and life evolved, were created and distributed since the birth of the Universe.	Delta II	ER, LC 17A
Dec. 18, 1999 1:57 p.m. EST	<b>Terra</b> The flagship in a new series of satellites that are part of the U.S. Global Change Research Program. It takes a global approach to data collection, enabling scientists to study the interaction among the four spheres of the Earth system—the oceans, lands, atmosphere and biosphere.	Atlas IIAS (AC-141)	WR, SLC 3E
Dec. 21, 1999 2:13 a.m. EST	<b>ACRIMSAT</b> ( <i>Active Cavity Radiometer Irradiance Monitor Satellite</i> ) A five-year science mission designed to measure the total amount of sunlight falling on Earth's atmosphere, oceans and land, and improve predictions of long-term climate change.	Taurus	WR, SLC 576E
March 25, 2000 3:34 p.m. EST	<b>IMAGE</b> ( <i>Imager for Magnetopause-to-Aurora Global Exploration</i> ) A two-year mission for a first of its kind satellite, dedicated to imaging the Earth's magnetosphere—an invisible magnetic field surrounding the planet that is strongly influenced by the solar wind.	Delta II (Delta 7326)	WR SLC 2
May 3, 2000 3:07 a.m. EDT	<b>GOES-L</b> ( <i>Geostationary Operational Environmental Satellite-L</i> ) NOAA weather satellite. Its primary objective is to provide a full capability satellite in an on-orbit storage condition, in order to assure NOAA continuity in services from a two-satellite constellation. Once in orbit, it was designated GOES-11.	Atlas II	ER, LC 36A
June 30, 2000 8:56 a.m. EDT	<b>TDRS-H</b> ( <i>Tracking and Data Relay Satellite-H</i> ) One of three satellites (labeled H, I and J) built by the Hughes Space and Communications Co. Uses an innovative springback antenna design. A pair of flexible mesh antenna reflectors, 15' in diameter, fold up for launch, then spring back into their original cupped circular shape on orbit. New satellites will augment the TDRSS' existing S- and Ku-band frequencies by adding Ka-band capability. Will serve as the sole means of continuous, high-data-rate communication with the Space Shuttle, the ISS upon its completion, and many scientific satellites in low earth orbit.	Atlas IIA (AC-139)	ER, LC 36A

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<b>Sept. 21, 2000</b> 3:22:04 a.m. PDT	<b>NOAA-L</b> ( <i>National Oceanic and Atmospheric Administration-L</i> ) Weather satellite for NOAA and the latest in the advanced TIROS-N series. It will continue the provision of a polar-orbiting platform to support the environmental monitoring instruments for imaging and measurement of the Earth's atmosphere, surface, and cloud cover, including Earth radiation, atmospheric ozone, aerosol distribution, sea surface temperature, vertical temperature and water profiles in the troposphere and stratosphere; measurement of proton and electron flux at orbit altitude, and remote platform data collection, and for SARSAT.	Titan II	WR, SLC 4W
<b>Oct. 9, 2000</b> 1:38 a.m. EDT	<b>HETE-2</b> ( <i>High Energy Transient Explorer-2</i> ) Designed to detect and localize gamma ray bursts and other explosive cosmic phenomena. An international mission, it replaces the original HETE, which was lost to a rocket launch failure in Nov. 1996.	Pegasus	Kwajalein
<b>Nov. 21, 2000</b> 1:24 p.m. EST	<b>EO-1/SAC-C</b> ( <i>Earth Observing-1/Satelite de Aplicaciones Cientificas-C</i> ) The New Millennium Program's first Earth Observing flight (EO-1), managed by NASA's Goddard Space Flight Center (GSFC), will validate revolutionary technologies contributing to the reduction in cost and increased capabilities for future land imaging missions. SAC-C is designed to advance the study of solar physics and astrophysics through the examination of solar flares, gamma ray bursts, diffuse X-ray cosmic background and energetic neutral atoms.	Delta 7320-10	WR SLC 2W
<b>April 7, 2001</b> 11:02 a.m. EDT	<b>2001 Mars Odyssey</b> The 2001 Mars Odyssey spacecraft, built by Lockheed Martin Space Systems for the Jet Propulsion Laboratory, is designed to map the Martian surface. It will search for geological features that could indicate the presence of water, now or in the past, and may contribute significantly toward understanding what is necessary for a more sophisticated exploration of Mars.	Delta 7925	ER, LC 17A
<b>June 30, 2001</b> 3:46:46 p.m. EDT	<b>MAP</b> ( <i>Microwave Anisotropy Probe</i> ) MAP is a NASA Explorer mission designed to measure the temperature of the cosmic background radiation over the full sky with unprecedented accuracy. This map of the remnant heat from the Big Bang will provide answers to fundamental questions about the origin and fate of our universe.	Delta II	ER, LC 17A
<b>July 23, 2001</b> 3:23:01 a.m. EDT	<b>GOES-M</b> ( <i>Geostationary Operational Environmental Satellite-M</i> ) The last in the current series of advanced geostationary weather satellites in service. It has a new instrument not on earlier GOES spacecraft, a Solar X-ray Imager, which can be used in forecasting space weather and the effects of solar storms.	Atlas II	ER, LC 36A
<b>August 8, 2001</b> 12:13:40 p.m. EDT	<b>Genesis</b> Designed to collect and return to Earth 10 to 20 micrograms of solar wind - invisible charged particles that flow outward from the Sun. The particles will be studied by scientists over the next century to search for answers to fundamental questions about the exact composition of our star and the birth of our solar system.	Delta II	ER, LC 17A

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<b>Sept. 21, 2001</b> 2:49 p.m. EDT (launch failure)	<b>QuikTOMS</b> ( <i>Quick Total Ozone Mapping Spectrometer</i> ) Designed to take over for the TOMS spacecraft in monitoring global ozone levels (including springtime ozone depletion in both the Arctic and the Antarctic), sulfur dioxide, ash, smoke from fires, and ultraviolet radiation reaching the Earth's surface. Problem with staging caused rocket to lose velocity, resulting in satellite being placed in improper orbit with insufficient speed.	Taurus	WR
<b>Sept. 29, 2001</b> 10:40 p.m. EDT	<b>Kodiak Star</b> First orbital launch utilizing the Kodiak Launch Complex in Alaska. Carried four satellites: NASA's Starshine 3 and three Dept. of Defense Space Test Program satellites (PICOSat, PCSat and Sapphire).	Athena I	Kodiak Launch Complex
<b>Dec. 7, 2001</b> 10:07:36 a.m. EST	<b>Jason/TIMED</b> ( <i>Jason 1/Thermosphere Ionosphere Mesosphere Energetics and Dynamics</i> ) Joint NASA/French Space Agency oceanography satellite Jason 1 will make observations of the global climate interaction between the sea and the atmosphere as a result of stored solar energy. TIMED will study the effects of the sun and human-induced activities on the Mesosphere and Lower Thermosphere/Ionosphere (MLTI), the region of Earth's atmosphere located approximately 40-110 miles (60-180 kilometers) above the Earth's surface.	Delta 7920-10 (100th launch of Delta II)	WR

<sup>1</sup> Acronyms used:

ETR = Eastern Test Range. Includes Cape Canaveral Air Station, Fla.

WTR = Western Test Range. Includes Vandenberg Air Force Base, Calif.

LC = Launch Complex, Eastern Range.

ER = Eastern Range. Most current designation.

WR = Western Range. Most current designation.

SLC = Space Launch Complex, Western Range.